



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,967	11/24/2003	Vladimir Grushin	PE0649USDIV7	5220

23906 7590 04/13/2005

E I DU PONT DE NEMOURS AND COMPANY
LEGAL PATENT RECORDS CENTER
BARLEY MILL PLAZA 25/1128
4417 LANCASTER PIKE
WILMINGTON, DE 19805

EXAMINER

KIELIN, ERJK J

ART UNIT	PAPER NUMBER
----------	--------------

2813

DATE MAILED: 04/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/720,967	GRUSHIN ET AL.	
	Examiner	Art Unit	
	Erik Kielin	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) 9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/24/03 10/13/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election of the species drawn to the combination of A-1, B-1, C-1, with claims 1-8 and 10-13 indicated to read thereon, in the reply filed on 13 January 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim 9 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

Information Disclosure Statement

The information disclosure statement filed 11/24/2003 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because some of the references have not been provided with dates in accordance with 37 CFR 1.98(b)(5). Also the MPEP 609 states,

“Each publication must be identified by publisher, author (if any), title, relevant pages of the publication, and **date** and place of publication. The date of publication supplied must include at least the **month and year** of publication, except that **the year of publication (without the month) will be accepted if the applicant points out in the information disclosure statement that the year of publication is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the particular month of publication is not in issue.**” (Emphasis added.)

The IDS has been placed in the application file, but only the references initialed by Examiner have been considered. Applicant is advised that the date of any re-submission of any item of

Art Unit: 2813

information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 ¶ C(1).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 10 and 11 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Applicant's admitted prior art article **Thompson** et al. "Ir(III) cyclometalated complexes as efficient phosphorescent emitters in polymer blend organic LEDs" Polymer Preprints 41(1), 2000, pp. 770-771.

Regarding claim 10, **Thompson** discloses an organic electronic device (specifically an organic LED; Introduction, first paragraph) the compound *fac* tris 2-(4',5'-difluorophenyl)pyridine Ir(III) complex, as shown in the right-hand column, structure 1. Clearly the two fluoride groups are attached in "at least one of R₁-R₈" positions and A=C, just as noted above. The Ir complex is in an amount of less than 20% (section entitled "LED preparation and testing").

Regarding claim 11, poly(N-vinyl carbazole) is a disclosed diluent for the Ir complexes (Introduction, last paragraph).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the article Baldo et al. "High-efficiency fluorescent organic light-emitting devices using a phosphorescent sensitizer" Nature, Vol. 403, 17 February 2000, pp. 750-753 (**Baldo-1**, hereafter), in view of the article **Dedeian** et al. "A new synthetic route to the preparation of a series of strong photoreducing agents: *fac* tris-ortho-metalated complexes of iridium(III) with substituted 2-phenylpyridines" Inorganic Chemistry, Vol. 30, 1991, 1685-1687.

Regarding claims 1 and 10, **Baldo-1** discloses an organic electronic device including the metal complex Ir(ppy)₃ wherein ppy is 2-phenylpyridine at 10% in CBP (4,4'-N,N'-dicarbazole-biphenyl) as the light-emitting layer --as further limited by instant claim 11-- N,N'-diphenyl-N,N'-bis(3-methylphenyl)-[1,1'-biphenyl]-4,4'-diamine --as further limited by instant claim 12-- and an electron transport layer of tris(8-hydroxyquinolato)aluminum (Alq₃)--as further limited by instant claim 13-- (Fig. 1, p. 751).

Baldo-1 does not indicate the exactly claimed Ir(ppy)₃ complex only in that the ppy is not shown to be substituted.

Dedeian discloses fluoro- and trifluoromethyl-substituted 2-phenylpyridines as light-emitting materials, as shown in the upper, right-hand corner of p. 1686. Table I, on the same page, shows the groups with which the 2-phenylpyridine is substituted. In particular, the

Art Unit: 2813

compounds labeled $\text{Ir}(4\text{-F-ppy})_3$ and $\text{Ir}(4\text{-F}_3\text{C-ppy})_3$ read on the presently claimed compounds.

None of adjacent pairs of $\text{R}_1\text{-R}_4$ and $\text{R}_5\text{-R}_8$ are joined. The "F" and " F_3C " groups read-on the presently claimed "at least one of $\text{R}_1\text{-R}_8$ is selected from F, $\text{C}_n\text{F}_{2n+1}$, $\text{OC}_n\text{F}_{2n+1}$, and OCF_2X , where $n=1\text{-}6$ and $\text{X}=\text{H}$, Cl, or Br." In the instant case, the first two of the group are anticipated; F_3C indicates that $n=1$. Because the ligand is of phenylpyridine, $\text{A} = \text{C}$.

Regarding claim 2, in the **Dedian** ppy ligands, x is 1 and each of y and z is 0.

Regarding claim 3, in the **Dedian** ppy ligands, none of $\text{R}_1\text{-R}_8$ is a nitro substituent.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use the substituted ppy ligands of **Dedian** as those in the **Baldo-1** $\text{Ir}(\text{ppy})_3$ complex to modify the wavelength of emission.

In this regard, it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol. "Reading a list and selecting a known compound to meet known requirements is no more

Art Unit: 2813

ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." 65 USPQ at 301.). (See MPEP 2144.07.)

Further regarding claim 1, although the amount of Ir(ppy)₃ is not taught in either of **Baldo-1** or **Dedian** to be greater than 20%, it would be a matter of routine optimization to choose greater than 20% to increase the intensity of light emitted by the device. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious). In this case there exists no evidence of record that the amount of the Ir(ppy)₃ complex is critical to the practice of the invention. Rather the instant disclosure teaches away from any such criticality by claiming greater than 20% (instant claim 1) or less than 20% (instant claim 10), essentially any amount works. Accordingly, it cannot be held novel and non-obvious to choose any amount of a quantity of a known compound absent some unexpected result in the organic electronic device fabricated, according to precedent.

Claims 1-3 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the article **Baldo-1** in view of the **Thompson** article.

Regarding claims 1 and 10, **Baldo-1** discloses an organic electronic device including the metal complex Ir(ppy)_3 wherein ppy is 2-phenylpyridine at 10% in CBP (4,4'-N,N'-dicarbazole-biphenyl) as the light-emitting layer --as further limited by instant claim 11-- N,N'-diphenyl-N,N'-bis(3-methylphenyl)-[1,1'-biphenyl]-4,4'-diamine --as further limited by instant claim 12-- and an electron transport layer of tris(8-hydroxyquinolato)aluminum (Alq_3)--as further limited by instant claim 13-- (Fig. 1, p. 751).

Baldo-1 does not indicate the exactly claimed Ir(ppy)_3 complex only in that the ppy is not shown to be substituted.

As noted above, **Thompson** discloses an organic LED having fluorine-substituted ppy as the Ir ligands and reading on the compounds of claims 1-3 and 10 stating that the solubility in organic solvents is improved by the addition of the fluorine substituents (paragraph bridging pp. 770-771).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to substitute the ppy ligands of **Baldo-1** with fluorine to improve the solubility of the ppy in the organic solvents used to manufacture the LED as taught in **Thompson**. Note that both **Baldo-1** and **Thompson** use spin-on processing of the Ir-complex in organic solvents to form the LED, so **Baldo-1** would benefit from the increased solubility, noted in **Thompson**.

Further regarding claim 1, although the amount of Ir(ppy)_3 is not taught in either of **Baldo-1** or **Thompson** to be greater than 20%, it would be a matter of routine optimization to choose greater than 20% to increase the intensity of light emitted by the device. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re*

Art Unit: 2813

Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious). In this case there exists no evidence of record that the amount of the Ir(ppy)₃ complex is critical to the practice of the invention. Rather the instant disclosure teaches away from any such criticality by claiming greater than 20% (instant claim 1) or less than 20% (instant claim 10), essentially any amount works. Accordingly, it cannot be held novel and non-obvious to choose any amount of a quantity of a known compound absent some unexpected result in the organic electronic device fabricated, according to precedent.

Claims 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Baldo-1** in view of Thompson, as applied to claims 1-3 above, and further in view of WO 00/70655 (Baldo et al., **Baldo-2**, hereafter).

The prior art of **Baldo-1** in view of Thompson, as explained above, discloses each of the claimed features except for the substituted ppy ligands.

Baldo-2, like **Thompson** discloses substituted phenylpyridine ligands for Ir, and teaches that the substituent groups can be located in any position on either ring of the phenylpyridine ligand. **Baldo-2** indicates that moving the functional group beneficially “give different color emission,” “different carrier transport,” and “alter the emissive properties” (**Baldo-2**, pp. 14-15).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to locate the substituents of **Baldo-1** in view of **Thompson** at each specific location on the phenylpyridine ring to beneficially affect the emissive properties of the Ir complex, as taught to be beneficial in **Baldo-2**. In other words, taking known substituents and moving them around on a known 2-phenylpyridine base cannot be considered obvious, since **Baldo-2** suggest moving around the substituents on either ring.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 571-272-1693. The examiner can normally be reached from 9:00 - 19:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Erik Kielin
Primary Examiner
April 9, 2005